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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/671,773	09/29/2003	Hung-Yu Chiu	0941-0848P	7558

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EXAMINER	
TOLEDO, FERNANDO L	
ART UNIT	**PAPER NUMBER**
2823	

DATE MAILED: 11/05/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/671,773	CHIU ET AL.	
	Examiner	Art Unit	
	Fernando L. Toledo	2823	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *10 September 2004*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-12* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-11* is/are rejected.

7)☒ Claim(s) *12* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *29 September 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☒ Certified copies of the priority documents have been received in Application No. 10/242,773.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1, 8 and 11 are rejected under 35 U.S.C. 102(b) as being anticipated by Bacchetta et al. (U. S. patent 5,627,403 A).

In re claim 1, Bacchetta, in the U. S. patent 5,627,403; figures 1 and 2 and related text discloses, forming a first dielectric layer (2,4) over the surface of the interconnect structure (7); forming a silicon-oxy-nitride (SiO_xN_y) layer (3) over the surface of the first dielectric layer; and forming a second dielectric layer 5 over the surface of the silicon-oxy-nitride layer (Figures 1 and 2); and wherein the interconnect structure comprises a metal interconnect layer and a substantially planarized inter-layered dielectric layer covering the metal interconnect layer (Column 5, Lines 35 – 40).

In re claim 8, Bacchetta discloses, wherein the memory device is a flash memory device (Column 5, Lines 7 – 10).

In re claim 11, Bacchetta discloses, wherein at least one of the first dielectric layer, the silicon-oxy-nitride (SiO_xN_y) layer, or the second dielectric layer comprises substantially planarized surface (Figures 1 and 2).

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Bacchetta as applied to claims 1 and 8 above.

Bacchetta discloses wherein the SiO_xN_y layer is about 12,000 Å thick.

Bacchetta does not disclose wherein the SiO_xN_y is from between 4,000 to 7,000 Å thick.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have the SiO_xN_y thickness to be between 4,000 to 7,000 Å, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller,* 105 USPQ 233. In addition, the selection of thickness, it's obvious because it is a matter of determining optimum process conditions by routine experimentation with a limited number of species of result effective variables. These claims are prima facie obvious without showing that the claimed ranges achieve unexpected results relative to the prior art range. In re Woodruff, 16 USPQ2d 1935, 1937 (Fed. Cir. 1990). See also In re Huang, 40 USPQ2d 1685, 1688 (Fed. Cir. 1996)(claimed ranges or a result effective variable, which do not overlap the prior art ranges, are unpatentable unless they produce a new and unexpected result which is different in kind and not merely in degree from the results of the prior art). See also In re Boesch, 205 USPQ 215 (CCPA) (discovery of optimum value of result effective variable in known process is ordinarily within skill or art) and In re Aller, 105 USPQ 233 (CCPA 1995) (selection of optimum ranges within prior art general conditions is obvious). Note that the specification contains no disclosure of either the critical nature of the claimed thicknesses or any unexpected results arising

therefrom. Where patentability is said to be based upon particular chosen thicknesses or upon another variable recited in a claim, the Applicant must show that the chosen thicknesses are critical. *In re Woodruf*, 919 F.2d 1575, 1578, 16 USPQ2d 1934, 1936 (Fed. Cir. 1990).

5. Claims 2, 3 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bacchetta as applied to claims 1 and 8 above, and further in view of Higashitani et al. (U. S. patent 6,346,737 B1).

In re claim 2, Bacchetta discloses forming the oxide film by PECVD.

Bacchetta does not disclose forming the oxide film by HDPCVD.

However, Higashitani, in the U. S. patent 6,346,737 B1; figures 1 – 2g and related text, discloses, that HDPCVD is a self-planarization process, that reduces the CMP times required in subsequent steps (Column 5, Lines 41 – 43).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to form the oxide layer of Bacchetta by HDPCVD, since as taught by Higashitani, HDPCVD is a self-planarization process, that reduces the CMP times required in subsequent steps.

6. In re claims 3 and 10, Bacchetta discloses wherein the first dielectric layer is 2,100 Å thick.

Bacchetta in view of Higashitani does not disclose wherein the thickness of the first dielectric layer is between 7,000 Å and 10,000 Å.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have the first dielectric layer thickness to be between 7,000 to 10,000 Å, since it has been held that where the general conditions of a claim are disclosed in the prior art,

discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller,* 105 USPQ 233. In addition, the selection of thickness, it's obvious because it is a matter of determining optimum process conditions by routine experimentation with a limited number of species of result effective variables. These claims are prima facie obvious without showing that the claimed ranges achieve unexpected results relative to the prior art range. In re Woodruff, 16 USPQ2d 1935, 1937 (Fed. Cir. 1990). See also In re Huang, 40 USPQ2d 1685, 1688 (Fed. Cir. 1996)(claimed ranges or a result effective variable, which do not overlap the prior art ranges, are unpatentable unless they produce a new and unexpected result which is different in kind and not merely in degree from the results of the prior art). See also In re Boesch, 205 USPQ 215 (CCPA) (discovery of optimum value of result effective variable in known process is ordinarily within skill or art) and In re Aller, 105 USPQ 233 (CCPA 1995) (selection of optimum ranges within prior art general conditions is obvious). Note that the specification contains no disclosure of either the critical nature of the claimed thicknesses or any unexpected results arising therefrom. Where patentability is said to be based upon particular chosen thicknesses or upon another variable recited in a claim, the Applicant must show that the chosen thicknesses are critical. *In re Woodruf,* 919 F.2d 1575, 1578, 16 USPQ2d 1934, 1936 (Fed. Cir. 1990).

7. Claims 4 – 6 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bacchetta as applied to claims 1 and 8 above, and further in view of Wolf and Tauber (Silicon Processing for the VLSI Era Volume 1: Process Technology).

In re claim 4, Bacchetta discloses forming the PSG layer with a CVD process (Column 5, Line 67).

Bacchetta does not disclose forming the PSG layer by APCVD.

However, Wolf in the textbook Silicon Processing for the VLSI Era Volume 1: Process Technology discloses that APCVD processes are simple reactors, have fast deposition at low temperatures (Page 168, Table 1).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to form the PSG layer of Bacchetta by APCVD since as taught by Wolf, APCVD processes are simple reactors, have fast deposition at low temperatures.

8. In re claims 5 and 10, Bacchetta discloses wherein the second dielectric layer is 4,000 Å.

Bacchetta in view of Wolf does not show, wherein the second dielectric layer is between 8,000 Å to 10,000 Å.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have the second dielectric layer thickness to be between 8,000 to 10,000 Å, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller,* 105 USPQ 233. In addition, the selection of thickness, it's obvious because it is a matter of determining optimum process conditions by routine experimentation with a limited number of species of result effective variables. These claims are prima facie obvious without showing that the claimed ranges achieve unexpected results relative to the prior art range. In re Woodruff, 16 USPQ2d 1935, 1937 (Fed. Cir. 1990). See also In re Huang, 40 USPQ2d 1685, 1688 (Fed. Cir. 1996)(claimed ranges or a result effective variable, which do not overlap the prior art ranges, are unpatentable unless they produce a new and unexpected result which is different in kind and not merely in degree from the results of the prior art). See also In re Boesch, 205 USPQ 215 (CCPA) (discovery of optimum value of result effective variable in known process is ordinarily within skill or art) and In re Aller, 105 USPQ 233 (CCPA 1995) (selection of optimum ranges

within prior art general conditions is obvious). Note that the specification contains no disclosure of either the critical nature of the claimed thicknesses or any unexpected results arising therefrom. Where patentability is said to be based upon particular chosen thicknesses or upon another variable recited in a claim, the Applicant must show that the chosen thicknesses are critical. *In re Woodruf*, 919 F.2d 1575, 1578, 16 USPQ2d 1934, 1936 (Fed. Cir. 1990).

9. In re claim 6, Bacchetta discloses wherein the SiO_xN_y layer is deposited.

Wolf discloses on page 161 that CVD processes are often selected over competing deposition techniques because they offer the following advantages: a) high purity; b) a great variety of chemical compositions can be deposited among others.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to form the SiO_xN_y layer of Bacchetta by CVD, since as taught by Wolf, CVD processes are often selected over competing deposition techniques because they offer the following advantages: a) high purity; b) a great variety of chemical compositions can be deposited among others.

10. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Bacchetta as applied to claims 1 and 8 above, and further in view of Sung (U. S. patent 6,235,592 B1).

Bacchetta discloses that the device is a memory device, such as an EEPROM.

Bacchetta does not disclose that the memory device could be a mask ROM.

However, Sung, in the U. S. patent 6,235,592 B1; figures 1a – 3 and related text, discloses, that memory devices could be, among others EEPROM, PROM and mask ROM (Column 1, Lines 18 – 25).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to teach that the memory device of Bacchetta could be a mask ROM, since as taught by Sung, memory devices include but are not limited to EEPROM, PROM and mask ROM.

Claim Objections

11. Claim 12 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Response to Arguments

12. Applicant's arguments filed 10 September 2004 have been fully considered but they are not persuasive for the following reasons.

13. Applicant argues that Baccehtta does not teach or suggest a substantially planarized interlayer dielectric layer over the surface of the semiconductor substrate covering the metal interconnect layer.

Examiner respectfully submits that Bacchetta discloses that the interlayer dielectric layer has a substantially planarized surface as shown in figures 1 and 2.

Conclusion

14. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period

will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Fernando L. Toledo whose telephone number is 571-272-1867. The examiner can normally be reached on Mon-Thu 7am to 5:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Olik Chaudhuri can be reached on 571-272-1855. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

George Fourson
Primary Examiner
Art Unit 2823

FToledo
02 November 2004